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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* MARK KARRS  
and  
JOHN V. ALBANO

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Appeal 2008-3684  
Application 09/973,401  
Technology Center 1700

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Decided: January 9, 2009

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Before CATHERINE Q. TIMM, ROMULO H. DELMENDO, and  
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

DELMENDO, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134 from a final rejection of claims 1-38 and 50-57 (Appeal Brief filed April 9, 2007, hereinafter “App. Br.”; Final Office Action mailed November 1, 2006). We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

## STATEMENT OF THE CASE

Appellants' invention "relates to a system . . . for catalytically reducing the content of undesirable compounds in a flue gas resulting from the combustion of fuel" (Specification, hereinafter "Spec.," 1, ll. 3-7).

Claims 1 and 21, the only independent claims on appeal, read as follows:

1. A system for catalytically treating a gas stream, which comprises:

a) a gas phase reactor containing a catalyst for the treatment of the gas stream in at least one catalyst bed having an upstream end and a downstream end;

b) an axial fan positioned upstream of the at least one catalyst bed and having a rotatable impeller for moving the gas stream through the gas phase reactor; and,

c) gas flow modification means positioned between the impeller and the gas phase reactor for decreasing gas stream velocity and increasing gas flow uniformity.

21. A system for catalytically treating a furnace flue gas, which comprises:

a) a gas phase reactor containing a catalyst for the treatment of the flue gas in at least one catalyst bed having an upstream end and a downstream end;

b) an axial fan positioned upstream of the at least one catalyst bed and downstream of a furnace and having a rotatable impeller for moving the flue gas from the furnace through the gas phase reactor; and,

c) means for recycling a portion of the flue gas from downstream of the axial fan to a convection section of the furnace located upstream of the axial fan.

(Claims Appendix, App. Br. 81, 83).

The Examiner relied upon the following as evidence of unpatentability:

Tyler	2,936,846	May 17, 1960
Ishikawa	5,043,146	Aug. 27, 1991
Yamaguchi	5,282,355	Feb. 1, 1994
Balling	5,397,545	Mar. 14, 1995
Zagoroff	5,476,378	Dec. 19, 1995
Surette	5,632,142	May 27, 1997
Acaster	5,709,088	Jan. 20, 1998
Carlborg	6,534,022 B1	Mar. 18, 2003
Carboni	EP 0166480 A1	Jan. 2, 1986

(hereinafter “EP ‘480”; *see* translation dated October 2004)

Appellants’ Admitted Prior Art in the Specification at page 9, lines 15-23.

The Examiner rejected the claims as follows:

- I. claims 1-3, 8, 14, and 15 under 35 U.S.C. § 102(b) as anticipated by EP ‘480;
- II. claims 1, 21-23, 31, 34, 35, and 38 under 35 U.S.C. § 103(a) as unpatentable over Yamaguchi;
- III. claims 2 and 3 under 35 U.S.C. § 103(a) as unpatentable over EP ‘480;
- IV. claim 4 under 35 U.S.C. § 103(a) as unpatentable over EP ‘480 in view of Surette;
- V. claims 5, 50, 51, and 53-55 under 35 U.S.C. § 103(a) as unpatentable over EP ‘480 in view of Surette and further in view of Tyler and Ishikawa;
- VI. claims 6 and 56 under 35 U.S.C. § 103(a) as unpatentable over EP ‘480 in view of Tyler and Ishikawa;
- VII. claims 7 and 18-20 under 35 U.S.C. § 103(a) as unpatentable over EP ‘480 in view of Yamaguchi;

- VIII. claims 9, 10, 12, and 13 under 35 U.S.C. § 103(a) as unpatentable over EP '480 in view of Balling;
- IX. claim 11 under 35 U.S.C. § 103(a) as unpatentable over EP '480 in view of Carlborg;
- X. claim 16 under 35 U.S.C. § 103(a) as unpatentable over EP '480 in view of Appellants' admitted prior art;
- XI. claim 17 under 35 U.S.C. § 103(a) as unpatentable over EP '480 in view of Acaster;
- XII. claims 21-24 under 35 U.S.C. § 103(a) as unpatentable over EP '480 in view of Yamaguchi;
- XIII. claims 25 and 26 under 35 U.S.C. § 103(a) as unpatentable over EP '480 in view of Yamaguchi and further in view of Tyler and Ishikawa;
- XIV. claims 25 and 26 under 35 U.S.C. § 103(a) as unpatentable over Yamaguchi in view of Tyler and Ishikawa;
- XV. claim 27 under 35 U.S.C. § 103(a) as unpatentable over Yamaguchi in view of Surette;
- XVI. claim 30 under 35 U.S.C. § 103(a) as unpatentable over Yamaguchi in view of Carlborg;
- XVII. claims 28, 29, 32, and 33 under 35 U.S.C. § 103(a) as unpatentable over Yamaguchi in view of Balling;
- XVIII. claim 36 under 35 U.S.C. § 103(a) as unpatentable over Yamaguchi in view of Appellants' admitted prior art;
- XIX. claim 37 under 35 U.S.C. § 103(a) as unpatentable over Yamaguchi in view of Acaster;

- XX. claim 52 under 35 U.S.C. § 103(a) as unpatentable over EP ‘480 in view of Surette, Tyler, and Ishikawa and further in view of Zagoroff;
- XXI. claim 57 under 35 U.S.C. § 103(a) as unpatentable over EP ‘480 in view of Surette and further in view of Tyler and Ishikawa.

(Examiner’s Answer mailed August 31, 2007, hereinafter “Ans.,” 3-20).

The Examiner’s position with respect to independent claim 1 is that EP ‘480 describes every limitation of the claim within the meaning of 35 U.S.C. § 102(b) (Ans. 3-4). Appellants, on the other hand, assert that the Examiner misconstrued the claim because the means-plus-function language in element c) (“gas flow modification means positioned between the impeller and the gas phase reactor for decreasing gas stream velocity and increasing gas flow uniformity”) was not properly interpreted in accordance with the strictures of 35 U.S.C. § 112, ¶6 (App. Br. 18-21).

As to independent claim 21, the Examiner alleges that “Yamaguchi discloses a system for catalytically treating a furnace flue gas (Fig. 2), which comprises [, inter alia,] . . . means for recycling a portion of the flue gas (via component 10) from downstream of the axial fan to a convection section (section 4)[.]” (Ans. 5). Again, Appellants assert that the Examiner failed to properly construe element c) (“means for recycling a portion of the flue gas from downstream of the axial fan to a convection section of the furnace located upstream of the axial fan”) under 35 U.S.C. § 112, ¶6 (App. Br. 30-32).







Appellants' Figure 2 shows a cutaway perspective view of the fan system, with cone 140 shown in greater detail (Spec. 5, ll. 1-2).

4. According to Appellants, "[t]he combined reduction of the diameter of the tail cone 140 at tapered end 141 and the increasing diameter of the housing at flared section 111 forms an annular diffuser which increases the cross sectional area available for gas flow and thereby reduces the velocity of the gas and tends to flatten the velocity profile of the gas" (Spec. 13, ll. 3-9).
5. Appellants' Specification (at page 15, lines 1-16) describes the recycling means as follows:

Recycle manifold 330 includes one or more pipe branches 331 extending from the side wall 304 of housing 301 for drawing flue gas from the proximal portion 303 of the chamber. The pipe branches 331 connect to a pipe main 332. Ammonia, or other reducing agent, is injected into the pipe main 332 at inlet 338. The recycled flue gas is directed through horizontal distributor pipe 334 and return pipes 335. The return pipes 335 are laterally spaced apart and provide a return flow of recycled flue gas into multiple regions of the convection section 20. A valve 333 is a means for controlling the recycling of the flue gas and thereby provides spill back control for the system 10. The recycling of the flue gas helps to reduce fluctuations in the ammonia content of the flue gas entering the catalyst bed by more thoroughly distributing the ammonia.
6. Figure 1 of EP '480 (with what appear to be the Examiner's handwritten markings) is reproduced below:

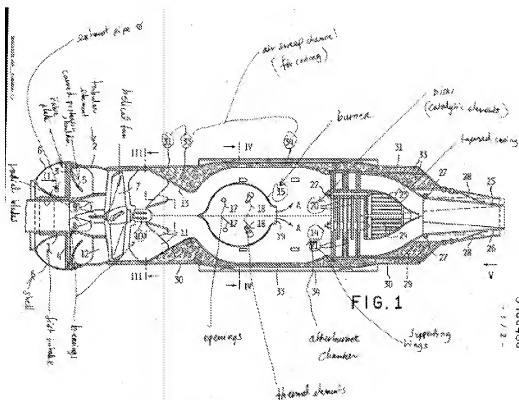


Figure 1 of EP '480 is said to depict an exhaust muffler-cleaner for internal combustion engines, wherein the muffler-cleaner includes, inter alia, a helical fan 7, burner 15, and catalytic elements made up of disks 20 alternating with rings 21 (Translation 1, 4, and 5).

7. Figure 2 of Yamaguchi is reproduced below:

**FIG. 2**

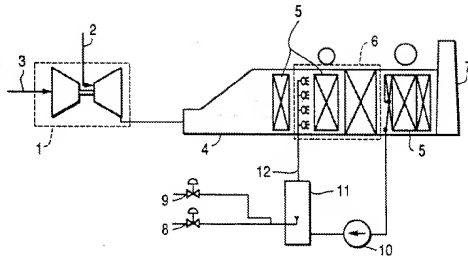


Figure 2 of Yamaguchi is said to depict a schematic system diagram of one example of an exhaust gas NO<sub>x</sub> removal system known prior to Yamaguchi's discovery, wherein the system includes, inter alia, gas turbine 1, NO<sub>x</sub> removal system 6, and an exhaust gas recirculation fan 10 that extracts NO<sub>x</sub>-free exhaust gas and introduces it to a vaporizer 11 where it is combined with aqueous ammonia 8 atomized with air or steam 9 (col. 1, ll. 15-47; col. 3, ll. 12-14).

## PRINCIPLES OF LAW

Under 35 U.S.C. § 112, ¶6, means-plus-function language must be construed in light of the disclosed means for performing the recited functions and equivalents thereof. *In re Donaldson*, 16 F.3d 1189, 1193 (Fed. Cir. 1994) (*en banc*) (“The plain and unambiguous meaning of paragraph six is that one construing means-plus-function language in a claim

must look to the specification and interpret that language in light of the corresponding structure, material, or acts described therein, and equivalents thereof, to the extent that the specification provides such disclosure.”).

“To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently.” *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997).

“Section 103 forbids issuance of a patent when ‘the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.’” *KSR Int’l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1734 (2007).

## ANALYSIS

### CLAIM 1:

The Examiner does not dispute Appellants’ contention that the claim limitation defined by element c) of claim 1 (“gas flow modification means positioned between the impeller and the gas phase reactor for decreasing gas stream velocity and increasing gas flow uniformity”) invokes the strictures of 35 U.S.C. § 112, ¶6 (Ans. 23-24). Rather, it is the Examiner’s position that EP ‘480 discloses a “flare portion” defined by a “contour of the inside insulation material 33 immediately after the constricted area 13” and that this “is structurally equivalent to the ‘gas flow modification means’ section 200 of the claimed invention” (*Id.*).

We cannot agree. The Examiner has not undertaken a rigorous means-plus-function analysis as required under 35 U.S.C. § 112, ¶6, and has

therefore failed to adequately establish that the “flare portion” in EP ‘480 is an “equivalent” of the claimed means.

Specifically, Appellants’ Specification reveals that the claimed gas flow modification means includes a generally cylindrical, longitudinally extending tail cone 140 having a distally pointing tapered end portion 141 with a generally conical shape and housing 110 with increasing diameter defined by section 111 (Facts 1-3). According to Appellants’ Specification, “[t]he combined reduction of the diameter of the tail cone 140 at tapered end 141 and the increasing diameter of the housing at flared section 111 forms an annular diffuser which increases the cross sectional area available for gas flow and thereby reduces the velocity of the gas and tends to flatten the velocity profile of the gas” (Facts 3 and 4).

By contrast, the Examiner has not shown that EP ‘480 describes any structure that even resembles the combination of the generally cylindrical, longitudinally extending tail cone 140 and housing 110 with increasing diameter defined by section 111. Not only does the device described in EP ‘480 lack what may be regarded as a generally cylindrical, longitudinally extending tail cone, but it also includes a constriction (around the vicinity of 13) that would increase – not decrease – gas stream velocity (Fact 6). While the inner diameter of the housing shown in EP ‘480 includes portions that do increase, those portions also include a burner 15, which has not been shown to necessarily decrease the gas stream velocity, much less increase gas flow uniformity.

For these reasons, we reverse the Examiner’s rejections of claim 1 and all claims dependent thereon.

CLAIM 21:

Similarly, the Examiner does not dispute Appellants' contention that the claimed recycling means invokes the strictures of 35 U.S.C. § 112, ¶6, but instead argues that Yamaguchi discloses the claimed structure (Ans. 5). The Examiner's position is in error. While the Examiner relies on element 10 of Yamaguchi's Figure 2, there is no evidence to indicate that such an element is in fact the same as Appellants' disclosed structure or an "equivalent thereof" (Facts 5 and 7).

Accordingly, we must also reverse the rejections of claim 21 and all claims dependent thereon.

CONCLUSION

On this record, we determine that Appellants have demonstrated that the Examiner misconstrued the means-plus-function language in element c) of claim 1 as well as the means-plus-function language in element c) of claim 21.

DECISION

The Examiner's decision to reject appealed claims 1-38 and 50-57 is reversed.

REVERSED

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